

CLAIMS

1. A metabolically engineered micro-organism having an operative first metabolic pathway in which a first metabolite is transformed into a second metabolite in a reaction in which NAD is a cofactor for a first enzyme, said reaction step producing NADH, and in which said second metabolite is transformed into at least one further metabolite in a reaction catalysed by a second enzyme, and having an operative second metabolic pathway characterised by an enzyme activity in excess of a native level in respect of a third enzyme catalysing a non-reversible reaction in which NADP is a cofactor and NADPH is a product and in which said first metabolite is transformed into a said further metabolite without the involvement of said second enzyme.
2. A micro-organism as claimed in claim 1, wherein said first metabolic pathway is a native pathway.
3. A micro-organism as claimed in any preceding claim, wherein said first enzyme is a phosphorylating dehydrogenase.
4. A micro-organism as claimed in claim 1 or claim 2, wherein said second enzyme is a kinase.
5. A micro-organism as claimed in claim 3, wherein said third enzyme is a non-phosphorylating dehydrogenase.

6. A micro-organism as claimed in claim 5, wherein said third enzyme is GAPN (EC 1.2.1.9).
7. A micro-organism as claimed in claim 6, wherein said 5 first enzyme is GAPDH (EC 1.2.1.12).
8. A micro-organism as claimed in any preceding claim, wherein at least one copy of a genetic sequence encoding said third enzyme has been recombinantly 10 introduced into said organism.
9. A micro-organism as claimed in any preceding claim, wherein a genetic sequence encoding said third enzyme is operatively linked to an expression signal not 15 natively associated with said genetic sequence in said organism.
10. A micro-organism as claimed in any preceding claim which is a yeast. 20
11. A micro-organism as claimed in claim 10, which is a micro-organism belonging to the genus *Saccharomyces*, *Klyuveromyces*, *Candida*, *Pichia*, *Debaromyces*, *Hansenula*, *Yarrowia*, *Zygosaccharomyces* or *Schizosaccharomyces*. 25
12. A micro-organism as claimed in claim 10, which is a strain of *Saccharomyces cerevisiae*, *S. kluyveri*, *S. bayanus*, *S. exigus*, *S. sevazzi*, *S. uvarum*, *Klyuveromyces lactis*, *K. marxianus* var. *marxianus*, *K. thermotolerans*, *Candida utilis*, *C. tropicalis*, *Pichia stipidis*, *P. pastoris*, *P. sorbitophila*, *Debaromyces hansenii*, *Hansenula polymorpha*, *Yarrowia lipolytica*, 30

Zygosaccharomyces rouxii or *Schizosaccharomyces pombe*..

13. A genetically transformed micro-organism containing one or more copies of an heterologous DNA sequence encoding GAPN operatively associated with an expression signal and having a functional native or heterologous expression capability for GAPDH (EC 1.2.12).
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14. A method of producing a desired metabolic product with decreased production of an undesired metabolic product, comprising culturing a micro-organism as claimed in any preceding claim.
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15. A method as claimed in claim 14, wherein the desired product is ethanol, lactic acid, citric acid, an amino acid or an antibiotic.
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16. A method as claimed in claim 14 or claim 15, wherein said undesired metabolic product is glycerol, acetate or an amino acid.
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